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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)	
Office Action Summary	10/808,945	CHILDERS ET AL.	
	Examiner	**Art Unit**	
	ALEX NOGUEROLA	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-4,7,14,15,18 and 21-24 is/are rejected.

7)☒ Claim(s) 5,6,8-13,16,17,19,20 and 25-29 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 March 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 8/20/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☒ Other: IDS of 3/25/2004.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informality: all serial numbers of relevant applications should not be left blank as has been done on page 1 of the specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 14, 15, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohman et al. US 2005/0042766 A1 ("Ohman").

Addressing claim 1, Ohman discloses a micro-filtration device for sorting cells (abstract and [0067]) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract and [0067]); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (implied by [0002] – "the micro fluidic structure according to the invention is useful in various fields of application such as ... electrophoresis, ..." and [0011] – "Also electric fields can be used to impose transport of dissolved charged species in microsystems ... electrodes and power supplies to apply electric fields etc.").

Addressing claim 14, Ohman discloses a cell sorter chip (abstract and [0067]) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figure 8 and [0058], which disclose that the flow path can be subdivided into zones wherein the columns can have different column height, diameter, geometry and/or different column density. The columns may be grouped into groups of columns having different size, shape or functionality);

and

means for electrically enhancing the sorting of cells (implied by [0002] – " the micro fluidic structure according to the invention is useful in various fields of application such as ... electrophoresis, ..." and [0011] – " Also electric fields can be used to impose transport of dissolved charged species in microsystems ... electrodes and power supplies to apply electric fields etc.").

Addressing claim 15, for the additional limitations of this claim see Figure 8.

Addressing claim 18, for the additional limitations of this claim see Figure 8 and [0002] – "the micro fluidic structure according to the invention is useful in various fields of application such as ... electrophoresis, ..." and [0011] – "Also electric fields can be used to impose transport of dissolved charged species in microsystems ... electrodes and power supplies to apply electric fields etc."

4. Claims 1, 2, 14, 15, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Austin et al. US 5,427,663 ("Austin").

Addressing claim 1, Austin discloses a micro-filtration device for sorting cells (abstract and Figures 1 and 2) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract and Figures 1-4, 6-8, 14-16, 17A-17E, 18A, and 18B); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (Figure 2 – 40, 42, Figure 6 – 40,42, Figure 9, 40,42).

Addressing claim 2, for the additional limitation of this claim note the location of electrodes 40, 42 in Figures 2, 6, and 9.

Addressing claim 14, Austin discloses a cell sorter chip (abstract and Figures 1 and 2) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figures 14 and 15 and col. 20:15-56, which discloses that the obstacles can be randomly arranged, the height, width and length of the obstacles can be controlled, and "red blood cells can be fractionated on the basis of physical properties which are otherwise difficult to probe by biological markers.");

and

means for electrically enhancing the sorting of cells (Figure 2 – 40, 42, Figure 6 – 40,42, Figure 9, 40,42).

Addressing claim 15, for the additional limitation of this claim see Figures 14 and 15.

Addressing claim 18, for the additional limitations of this claim see Figures 14 and 15 and the abstract ('Electrodes may be positioned within the receptacles to generate an electric field in the fluid medium in the receptacle in order to induce the migration of the microstructures.")

5. Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Christel et al. US 7,135,144 B2 ("Christel").

Addressing claim 1, Christel discloses a micro-filtration device for sorting cells (abstract and Figure 7) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; col. 03:32-37; and Figure 7); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (note "dielectrophoresis" in abstract).

Addressing claim 3, for the additional limitation of his claim note "dielectrophoresis" in the abstract.

Addressing claim 4, that the non-uniform electric field is a temporally varying non-uniform electric field in a second direction different from the first direction is implied because Christel discloses that the dielectrophoresis field may be used to attract particles to the microstrucutres that define the array of openings in the barrier structure. See col. 09:07-12.

6. Claims 1, 14, 15, and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al. US 7,150,812 B2 ("Huang").

Addressing claim 1, Huang discloses a micro-filtration device for sorting cells (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31; and claim 8); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (implied by "a field is applied to the particles being separated as the particles pass through the array. The field that drives the particles being separated may be a force field, such as an electric field, ..." (col. 06:31-47 – also note "electro-kinetic flow" and "electro-osmotic flow") and claims 5 and 7 ("electrical, electrophoretic, electro-osmotic", "electrical field")).

Addressing claim 14, Huang discloses a cell sorter chip (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figure 16 and col. 10:21-28, which discloses that the obstacles may have different shapes or dimensions);

and

means for electrically enhancing the sorting of cells (implied by " a field is applied to the particles being separated as the particles pass through the array. The field that drives the particles being separated may be a force field, such as an electric field, ..." (col. 06:31-47 – also note " electro-kinetic flow" and " electro-osmotic flow") and claims 5 and 7 (" electrical, electrophoretic, electro-osmotic" , " electrical field")).

Addressing claim 15, for the additional limitation of this claim see Figure 16.

Addressing claim 18, for the additional limitations of this claim see Figure 16 and "a field is applied to the particles being separated as the particles pass through the array. The field that drives the particles being separated may be a force field, such as

an electric field, ..." (col. 06:31-47 – also note "electro-kinetic flow" and "electro-osmotic flow") and claims 5 and 7 ("electrical, electrophoretic, electro-osmotic", "electrical field").

7. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Fisher US 5,376,878 ("Fisher").

Addressing claim 1, Fisher discloses a micro-filtration device for sorting cells (abstract; and Figures 1, 5, and 6) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; Figures 1, 5, and 6; and col. 08:34 – col. 09:20); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (20, 22).

Addressing claim 2, for the additional limitation of this claim see Figures 1, 5, and 6.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. US 7,150,812 B2 ("Huang") in view of Noca et al. US 6,685,810 B2 ("Noca").

Huang discloses a micro-filtration device for sorting cells (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31; and claim 8); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (implied by "a field is applied to the particles being separated as the particles pass through the array. The field that drives the particles being separated may be a force field, such as an electric field, ..." (col. 06:31-47 – also note "electro-kinetic flow" and "electro-osmotic flow") and claims 5 and 7 ("electrical, electrophoretic, electro-osmotic", "electrical field")).

Huang does not mention whether the electrode arrangement is separate from the array of openings. However, since Huang teaches apply an electrical field across the barrier structure to cause electrophoresis or electro-osmotic flow it would have been obvious to one with ordinary skill in the art to place the electrodes for electrophoresis or electro-osmosis in the reservoirs at the ends of the apparatus, which is commonly done in electrophoresis devices. See, for example, the abstract and Figures 1 and 5 in Noca.

12. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Christel et al. US 7,135,144 B2 ("Christel") in view of Noca et al. US 6,685,810 B2 ("Noca").

Christel discloses a micro-filtration device for sorting cells (abstract and Figure 7) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; col. 03:32-37; and Figure 7); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (note "dielectrophoresis" in abstract).

Christel does not mention whether the electrode arrangement is separate from the array of openings. However, since Christel teaches apply an electrical field across the barrier structure to cause electrophoresis or electro-osmotic flow it would have been obvious to one with ordinary skill in the art to place the electrodes for electrophoresis or electro-osmosis in the reservoirs at the ends of the apparatus, which is commonly done in electrophoresis devices. See, for example, the abstract and Figures 1 and 5 in Noca.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Christel et al. US 7,135,144 B2 ("Christel").

Christel discloses a micro-filtration device for sorting cells (abstract and Figure 7) comprising:

an apparatus including a barrier structure defining an array of openings arranged within a fluid flow path, the openings having at least one of a size and a shape configured to direct only a portion of the cells through the openings based on at least one of a size and a shape of each cell (abstract; col. 03:32-37; and Figure 7); and

an electrode arrangement disposed about the array of openings and configured to apply an electric field to enhance direction of the portion of the cells through the openings (note "dielectrophoresis" in abstract).

That the openings have an elongate shape may be seen in Figures 1a – 1d. As for the electrode arrangement being arranged to form the non-uniform electric field substantially aligned with the elongate shape of the openings, although the electrode arrangement is not described it would have been obvious to one with ordinary skill in the art at the time of the invention to have the electrode arrangement so arranged because Christel discloses using the non-uniform field to attract particles to the microstructures that define the openings in the barrier structure.

14. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohman et al. US 2005/0042766 A1 ("Ohman").

Addressing claim 23, Ohman discloses a cell sorter chip (abstract and [0067]) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figure 8 and [0058], which disclose that the flow path can be subdivided into zones wherein the columns can have different column height, diameter, geometry and/or different column density. The columns may be grouped into groups of columns having different size, shape or functionality);

and

means for electrically enhancing the sorting of cells (implied by [0002] – " the micro fluidic structure according to the invention is useful in various fields of application such as ... electrophoresis, ..." and [0011] – " Also electric fields can be used to impose transport of dissolved charged species in microsystems ... electrodes and power supplies to apply electric fields etc.").

Thus, it would have been obvious to one with ordinary skill in the art at the time

of the invention to perform the claimed directing and encouraging steps because these are just steps of using the cell sorter chip as intended, which is basically to use an electrokinetic force to cause cells to flow through an array of fluid openings.

Addressing claim 24, the aligning of each cell will inherently occur they pass through (if they pass through) the different groups or zones of obstacles, which differ in size, shape, or functionality.

15. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Austin et al. US 5,427,663 ("Austin").

Addressing claim 23, Austin discloses a cell sorter chip (abstract and Figures 1 and 2) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figures 14 and 15 and col. 20:15-56, which discloses that the obstacles can be randomly arranged, the height, width and length of the obstacles can be controlled, and "red blood cells can be fractionated on the basis of physical properties which are otherwise difficult to probe by biological markers.");

and

means for electrically enhancing the sorting of cells (Figure 2 – 40, 42, Figure 6 – 40,42, Figure 9, 40,42).

Thus, it would have been obvious to one with ordinary skill in the art at the time of the invention to perform the claimed directing and encouraging steps because these are just steps of using the cell sorter chip as intended, which is basically to use an electrokinetic force to cause cells to flow through an array of fluid openings.

Addressing claim 24, the aligning of each cell will inherently occur they pass through (if they pass through) the different groups or zones of obstacles, which differ in size or shape.

16. Claims 23 and 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. US 7,150,812 B2 ("Huang").

Addressing claim 23, Huang discloses a cell sorter chip (abstract; col. 06:18-20; and Figures 1-19, 23, 27, 28, 30, and 31) comprising:

means for sorting cells based on a plurality of dimensions of the cells (implied by Figure 16 and col. 10:21-28, which discloses that the obstacles may have different shapes or dimensions);

and

means for electrically enhancing the sorting of cells (implied by " a field is applied to the particles being separated as the particles pass through the array. The field that drives the particles being separated may be a force field, such as an electric field, ..." (col. 06:31-47 – also note " electro-kinetic flow" and " electro-osmotic flow") and claims 5 and 7 (" electrical, electrophoretic, electro-osmotic" , " electrical field")).

Thus, it would have been obvious to one with ordinary skill in the art at the time of the invention to perform the claimed directing and encouraging steps because these are just steps of using the cell sorter chip as intended, which is basically to use an electrokinetic force to cause cells to flow through an array of fluid openings.

Addressing claim 24, the aligning of each cell will inherently occur they pass through (if they pass through) the different groups or zones of obstacles, which differ in size or shape.

Claim Rejections - 35 USC § 112

17. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

18. Claims 21 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 21 is unclear because it requires the second filtration device to succeed the first filtration device, yet it also requires the first filtration device to succeed the second filtration device. Should the second occurrence of "the first filtration device" be -- a third filtration device --?

Note that dependent claims will have the deficiencies of base and intervening claims.

Allowable Subject Matter

19. Claims 5, 6, 8-13, 16, 17, 19, 20, and 25-29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. Claims 21 and 22 would be allowable if rewritten to overcome the rejection under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter:

a) Claim 5 - the combination of limitations requires "a second set of openings permitting passage of cells of a second size, smaller then the first size, in the first direction."

Christel only discloses providing a first set of openings permitting passage of cells of a first size in the first direction. Additionally the implied electrode arrangement is for applying a temporarily varying non-uniform electric field to attract particles to the misconstrues that define the openings in the barrier structure, not to move cells in the

second direction, which is transverse to the first direction of the fluid flow path, away from the first and second set of openings.

b) Claim 6 – Christel discloses neither the plurality of barrier arrays nor the plurality of transport paths as claimed. Also, the implied electrodes arrangement is for applying a temporarily varying non-uniform electric field to attract particles to the misconstrues that define the openings in the barrier structure, not to move cells in the second direction.

c) Claim 8 – the combination of limitations requires "a first set of openings wherein the electrode arrangement straddles the first set of openings to apply the non-uniform electric field to substantially align a long axis of the cells with a long axis of the openings of the first set of openings. " In Christel the electrode arrangement is to attract particles, such as DNA, to the microstructures that define the openings in the barrier structure. Christel does not disclose using the electrode arrangement to "substantially align a long axis of the cells with a long axis of the openings of the first set of openings." See in Christel col. 09:07-09. Miller et al. ("Electro-orientation of ellipsoidal erythrocytes- Theory and experiment, Biophys. J. vol. 64, May·1993, pp. 1588-1596) discusses electro-orientation of ellipsoidal erythrocytes along the major or minor axis of human cells (three orientations for llama cells) in a chamber made over a microscope slide that does not have fluid flow or an array of openings through which the cells may

pass. See the abstract, Figure 1 and **Experimental Results** – orientation observations on pages 1589 – 1590. Gimsa ("A comprehensive approach to electro-orientation, electrodeformation, dielectrophoresis, and electrorotation of ellipsoidal particles and biological cells," Bioelectrochemistry 54 (2110) 23-31) presents a theoretical discussion on electro-orientating ellipsoidal particles and biological cells. See the abstract.

d) Claims 9-12 depend directly or indirectly from allowable claim 8.

e) Claim 13 - none of Ohman, Austin, Christel, Huang, or Fisher discloses at least one of an acoustic device and an electric device each configured to apply a force to the cells traveling along the fluid flow path to prevent aggregation of the cells within the apparatus.

f) Claim 16 – the combination of limitations requires the means for electrically enhancing the sorting to comprise an electrode array disposed and arranged to generate an electric field to align a long axis of the cells with the long axis f the openings. In Ohman, Austin, and Huang the electrode array is disposed and arranged to generate an electric field to pull or propel the cells from one end of the chip to the other, by electrophoresis, electrosmosis, or an other electrokinetic field. The electric

field is not configured to align " a long axis of the cells with the long axis of the openings." Miller et al. ('Electro-orientation of ellipsoidal erythrocytes- Theory and experiment, Biophys. J. vol. 64, May 1993, pp. 1588-1596) discusses electro-orientation of ellipsoidal erythrocytes along the major or minor axis of human cells (three orientations for llama cells) in a chamber made over a microscope slide that does not have fluid flow or an array of openings through which the cells may pass. See the abstract, Figure 1 and **Experimental Results** – orientation observations on pages 1589 – 1590. Gimsa ("A comprehensive approach to electro-orientation, electrodeformation, dielectrophoresis, and electrorotation of ellipsoidal particles and biological cells," Bioelectrochemistry 54 (2110) 23-31) presents a theoretical discussion on electro-orientating ellipsoidal particles and biological cells. See the abstract.

g) Claim 17 depends from allowable claim 16.

h) Claim 19 – the combination of limitations requires the means for electrically enhancing the sorting to be disposed for transporting the cells in a second direction to a location out of the fluid flow. In Ohman, Austin, and Huang the means for electrically enhancing the sorting is disposed for transporting the cells along a path of the fluid flow, as the electrodes for electrically enhancing the sorting are or would be located at the

ends of the chip for causing electrophoresis, electroomosis, or other electrokinetic flow through the chip from one end to the other.

i) Claim 20 depends from allowable claim 19.

j) Claim 21 – neither Ohman, Huang, nor Austin discloses first filtration, second filtration, and apparently a third filtration deice (see the rejection under 35 U.S.C. 112, second paragraph, above) arranged as claimed.

k) Claim 22 depends from allowable claim 21.

l) Claim 25 – the combination of limitations requires the step of " applying the electric field to align the major axis of each cell with major axis of one of the fluid openings." In Ohman, Austin, and Huang the electrode array is disposed and arranged to generate an electric field to pull or propel the cells from one end of the chip to the other, by electrophoresis, electrosmosis, or an other electrokinetic field. The electric field is not configured to " align the major axis of each cell with major axis of one of the fluid openings." Miller et al. ('Electro-orientation of ellipsoidal erythrocytes-Theory and experiment, Biophys. J. vol. 64, May 1993, pp. 1588-1596) discusses

electro-orientation of ellipsoidal erythrocytes along the major or minor axis of human cells (three orientations for llama cells) in a chamber made over a microscope slide that does not have fluid flow or an array of openings through which the cells may pass. See the abstract, Figure 1 and **Experimental Results** – orientation observations on pages 1589 – 1590. Gimsa ("A comprehensive approach to electro-orientation, electrodeformation, dielectrophoresis, and electrorotation of ellipsoidal particles and biological cells," Bioelectrochemistry 54 (2110) 23-31) presents a theoretical discussion on electro-orientating ellipsoidal particles and biological cells. See the abstract.

m) Claim 26 depends from allowable claim 25.

n) Claim 27 – the combination of limitations requires that the encouraging cell passage comprises " aligning the major axis of each cell with the direction of passage through the fluid openings." ." In Ohman, Austin, and Huang the electrode array is disposed and arranged to generate an electric field to pull or propel the cells from one end of the chip to the other, by electrophoresis, electrosmosis, or an other electrokinetic field. The electric field is not configured to " align the major axis of each cell with major axis of one of the fluid openings." Miller et al. ('Electro-orientation of ellipsoidal

erythrocytes- Theory and experiment, Biophys. J. vol. 64, May 1993, pp. 1588-1596) discusses electro-orientation of ellipsoidal erythrocytes along the major or minor axis of human cells (three orientations for llama cells) in a chamber made over a microscope slide that does not have fluid flow or an array of openings through which the cells may pass. See the abstract, Figure 1 and **Experimental Results** – orientation observations on pages 1589 – 1590. Gimsa ("A comprehensive approach to electro-orientation, electrodeformation, dielectrophoresis, and electrorotation of ellipsoidal particles and biological cells," Bioelectrochemistry 54 (2110) 23-31) presents a theoretical discussion on electro-orientating ellipsoidal particles and biological cells. See the abstract.

n) Claim 28 – the combination of limitations requires the step of "moving the different groups of cells in independent, generally parallel pathways in a direction generally transverse to the flow of cells through the array of fluid openings by application of the electric field as a temporally varying non-uniform electric field along each pathway."

o) Claim 29 - Ohman and Huang do not describe the electrical field except to indicate that it may create electrophoresis flow or electroosmtic flow, which is usually caused with a DC power source. Austin also indicates that the electrical field may be used for electrophoresis and shows a DC power source in Figures 2 and 6.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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